1. A defect detection system comprising:

an excitation laser system for projecting a laser beam at the near surface of a sample to be tested for generating acoustic longitudinal, surface Rayleigh, and shear waves in the sample;

a detection laser system spaced from said excitation laser to intercept shear waves reflected from the far surface of the sample at approximately the angle of maximum shear wave propagation; and

a detection circuit for detecting the energy level of the reflected shear wave intercepted by said detection laser system representative of a flaw in the sample.

2. The defect detection system of claim 1 in which the excitation laser system and detection laser system are on the same side of the sample.

3. The defect detection system of claim 1 including a movable support for said excitation laser system and detection laser system for moving them along the sample.

4. The defect detection system of claim 1 in which said detection circuit includes a shear wave sensing circuit for sensing the energy level of the acoustic wave and the time of arrival of the reflected shear wave at the detection laser system.

5. The defect detection system of claim 4 in which said detection circuit includes a first logic circuit for recognizing the presence of a potential flaw if the energy level of the acoustic wave sensed by said shear wave sensing circuit is less than a predetermined level.

6. The defect detection system of claim 5 in which said detection circuit includes a surface Rayleigh wave sensing circuit for sensing the energy level of the acoustic wave at the time of arrival of the surface Rayleigh wave at the detection laser system.

7. The defect detection system of claim 6 in which said detection circuit includes a second logic circuit for inhibiting recognition of a potential flaw if the energy level of the acoustic wave sensed by said surface Rayleigh wave sensing circuit is less than a predetermined level and confirming recognition if it is greater than the predetermined level.

8. The defect detection system of claim 1 in which said detection circuit includes a scanning device for sensing the variation in the energy level of the reflected shear wave along the sample to create shadows of a flaw.

9. The defect detection system of claim 8 in which said detection circuit includes a measuring circuit for measuring the length of each shadow cast by a flaw blocking shear wave propagation and the distance between those shadows.

10. The defect detection system of claim 9 including a positioning circuit for determining the location, size and orientation of a flaw.

11. The defect detection system of claim 1 in which the sample includes steel and the angle of maximum shear wave propagation is approximately 40°.

12. A method of detecting a defect in a sample comprising:

photoacoustically exciting acoustic longitudinal, surface Rayleigh, and shear waves at a first point on the near surface of the sample;

photoacoustically detecting acoustic waves at a second point spaced from the excitation first point for intercepting shear waves reflected from the far surface of the sample at approximately the angle of maximum shear wave propagation; and

detecting the energy level of the intercepted reflected shear wave representations of a flaw in the sample.

13. The method of claim 12 in which the excitation and detection occurs on the same side of the sample.

14. The method of claim 12 in which the excitation and detection points are moved along the sample.

15. The method of claim 12 further including sensing the energy level of the reflected shear wave and recognizing the presence of a potential flaw if the energy level is below a predetermined level.

16. The method of claim 12 further including sensing the energy level of the surface Rayleigh waves and inhibiting detection of a flaw if that level is below a predetermined level and confirming recognition if it is greater than the predetermined level.

17. The method of claim 12 further determining the variation in energy level of the reflected shear wave along the sample to create shadows of the flaw.

18. The method of claim 17 further including measuring the length of each shadow cast by the flaw.

19. The method of claim 18 further including determining the location, size and orientation of a flaw from the size and separation of the shadows.